Research Pays Off For the Guard:

A Device-Based Strategy For Training Tank Gunnery

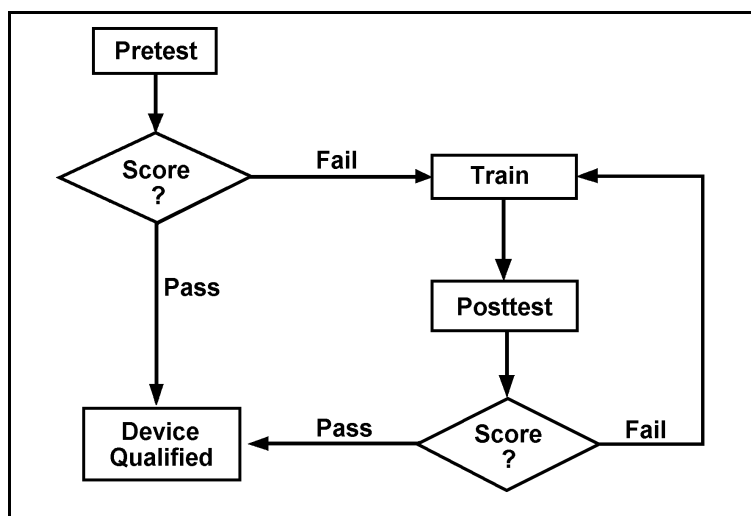**by Dr. Joseph D. Hagman and Dr. John E. Morrison**

Figure 1

As a National Guard armor unit trainer, how often have you faced the question of how best to use training devices in preparing tank crews for successful first-run qualification on Tank Table VIII (TTVIII)? Sure, guidance is out there,[1,2] but time constraints always seem to force compromises.

Well, would you be interested if we were to show you how to complete the device-based portion of your tank gunnery training program in just three drill weekends, and afterwards be able to predict how many of your crews would be first-run TTVIII qualifiers? The Army Research Institute at Boise, Idaho, has developed a device-based tank gunnery training strategy that will allow you to do just that. In addition, this strategy will eliminate any guesswork in determining the crews to be trained, the devices to be used, the training and evaluation exercises to be conducted, and which device to use in order to maximize the payoff from your training time investment.

THE PROPOSED STRATEGY

Pretesting

The strategy, as shown in Figure 1, begins with a 60-75 minute pretest on the Conduct-of-Fire Trainer (COFT) to determine each crew's gunnery proficiency.[3] The pretest involves the firing of four "gate" exercises (131-134) from the COFT's advanced matrix. You simply add up the scores from each (after subtracting "crew cuts") and divide by 4 to arrive at a total pretest score. This score is then plugged into Column 1 of Table 1 to find a crew's predicted average TTVIII score (Column 2) and associated probability of first-run qualification (Column 3). A crew firing 765 on the pretest, for example, would be predicted to fire an average score of 700 on TTVIII (if fired multiple times) and have a 50-50 chance of actual first-run qualification.

Depending on the commander's standard for his unit's first-run TTVIII qualification rate (from Column 3 of Table 1), some crews will pass the pretest (device-qualified crews) while others will not (device-unqualified crews). According to the strategy, you will only need to train the latter on devices. Thus, valuable time is not taken up training crews that are already device-proficient.

Training

Having identified which crews need to be trained, the next step is to determine which training device(s) to use, and which training exercises to conduct. According to the strategy, training can be conducted on either the COFT or the Abrams Full-Crew Interactive Simulation Trainer (AFIST),[5] and should focus on only the simulated TTVIII engagements not performed to pretest standard. This standard is determined by dividing the pretest score (for example, 765) by 10 (the number of engagements fired per exercise). Any engagements not fired to this standard (for example, 76.5) must be trained. To help you do this, Table 2 shows the training exercises on each device that simulate each TTVIII engagement.

Except for Engagement A2, the simultaneous engagement, which requires use of the Caliber .50 machine gun not simulated by AFIST, we recommend using AFIST whenever possible because it supports full-crew training. If AFIST is not available, we recommend alternating between or among the training exercises shown in Table 2 for the COFT. This will add variety and promote device-to-tank transfer.

COFT Pretest SCORE	Predicted Average TTVIII Score	Probability of Scoring ≥ 700 on TTVIII
620	562	10%
669	609	20%
706	644	30%
737	673	40%
765	700	50%
793	727	60%
824	756	70%
861	791	80%
910	838	90%

Table 1. Predicted Tank Crew TTVIII Score and Probability of First-Run Qualification for Selected COFT Pretest Scores[4]

TTVIII Exercises	COFT Training Exercises	AFIST Training Engagements
A1	113, 117	6AT1
A2	101, 111	—
A3	102, 106	6AT2
A4	102, 106, 110	6AT3
A5S	102, 106, 110	6AT4
A5A	102, 106, 110	6AT5
B1S	103, 107, 119	6BT1
B2	105	6BT2
B3	110	6BT3
B4	102, 106, 110	6BT4
B5	113, 117	6AT1
B5A	105	6BT5

Table 2. COFT and AFIST Training Exercises for TTVIII Engagements

Regardless of which device is used, we suggest that an easy-to-difficult progression be followed when pretesting reveals that some crews need training on more than one simulated TTVIII engagement. Table 3 shows the difficulty rankings that we've found recently for live-fire Table VIII engagements.[6] So engagement B5, for example, would be trained before B2, A1 before A3, and so forth. To make sure that tank crews become device-proficient and, at the same time, don't pass a training exercise by luck, we recommend that the proficiency standard for training exercises be set at two successful, but not necessarily consecutive, criterion performances. On COFT, a criterion performance is reached when the crew receives an "advance" recommendation from the device in the areas of target acquisition, reticle aim, and system management. On AFIST, criterion performance is reached upon crew receipt of a "pass" recommendation from the device for the exercise(s) being trained.

Post-testing

Just because a crew passes the training exercises doesn't necessarily mean that it is device-qualified. So, the last step in the strategy is to post-test your crews by having them retake the pretest. Those that pass the post-test are now device-qualified; those that fail the post-test must return for further training on devices, as outlined above.

We've designed this strategy to be used by units over three (preferably consecutive) drill weekends once pretesting is completed. The hour or so needed for pretesting should be included as part of the Tank Crew Gunnery Skills Test, with Readiness Management Assemblies used if drill time runs out.

Before the first scheduled drill after pretesting, pretest scores should be compared against the performance standard for first-run TTVIII qualification set by your unit commander (from Column 3 of Table 1). This will allow you to determine which crews are device-unqualified and which engagements they need to fire during training.

Similarly, the training results of this and the next two drills should be reviewed to select the right training exercises for those crews not ready for post-testing and to post-test those that have completed training. Once your crews are all device-qualified, by virtue of passing either the pre- or post-test, on-tank training should begin, probably with TTV[2,7] or with Combat Table I.[8] Regardless of where you start, on-tank training is important because it allows crews to experience the different aspects of gunnery not practiced or simulated on devices (for example, open-hatch target acquisition, tank move-ment, and weapon recoil effects) but important for successful TTVIII qualification.

Conclusions

What will this strategy allow you to do in the future that you can't do now? For starters, you will be able to schedule your device-based training time more efficiently by targeting only crews in need of remediation. You will also know which devices to use and which exercises to conduct when training is needed. And lastly, because device performance standards are keyed to expected live-fire outcomes, you will know when crews have received enough device training to warrant transition to the tank, and what the expected result will be on your unit's first-run TTVIII qualification rate.

After all, tank gunnery training on devices takes time. Although this time is scarce, we think that the strategy just described provides the tools you need to use it wisely. Let us know what you think.

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Notes

[1]U.S. Army Armor School. (1990). *Armor Training Strategy* (ST 17-12-7). Fort Knox, Ky.: Author.

[2]Department of the Army (1993). *Tank Gunnery Training (Abrams)* (FM 17-12-1-2). Washington, D.C.: Author.

[3]Use of AFIST for pretesting must await development of validated performance standards similar to those now available for COFT (see Note 4).

	Engagement										
	A3	B3	A2	A1	B2	A4	B4	B5	A5S	A5A	B5A	B1S
	Most											Least
Difficulty Ranking	1	2	3	4	5	6.5	6.5	8	9	10	11	12

Table 3. Difficulty Rankings of TTVIII Engagements

[4]From "Device-Based Prediction of Tank Gunnery Performance," by J.D. Hagman and M.D. Smith, *Military Psychology, 8, 59-68.* Copyright 1996 by Lawrence Erlbaum Associates, Publishers. Reprinted with permission.

[5]Snyder, S.J., "The Guard Unit Armory Device Full Crew Interactive Simulation Trainer (GUARDFIST-1)," *ARMOR,* March-April 1996, pp. 40-43.

[6]Hagman, J.D. (1994). *Performance analysis of Table VIII tank gunnery engagements* (Res. Rep. 1669). Alexandria, Va.: U.S. Army Research Institute for the Behavioral and Social Sciences.

[7]Shaler, M.D. (1995). *Compressed gunnery program for Abrams Tank battalions: Trainer's handbook.* Project SIMITAR.

[8]U.S. Army Armor Center (1995). *Enhanced mounted brigade training strategy.* Fort Knox, Ky.: Author.

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